

Diamond Magnetometry in Cars and Aircraft

Supervisor: Dr Gavin W Morley

Group: Diamond

Funding: Fully funded PhD studentship (48 months) for UK or EU students

Start date: October 2019 Application deadline: ongoing

Background

The sensing of weak magnetic fields has important applications in geo-surveying, navigation, and medicine. To measure them requires that we use the most sensitive detection techniques, however, to be commercially viable this must be done at an affordable cost. Nitrogen-vacancy (NV) centres in diamond have isolated electron spins which can store quantum information at room temperature for over one millisecond. These qubits can be sensitively read out optically allowing diamond magnetometers to be built. These are robust, solid state devices that work in a broad range of environments, with the potential for sensitivity comparable to the leading technologies.

The project

We have built several magnetometers using the optically-detected magnetic resonance of nitrogen-vacancy centres in diamond. In this PhD project we will make this work inside moving cars and in helicopters in flight. In-flight magnetometry could lead to geo-surveying while operation in a car could be used for navigation via magnetic maps. Our lab in Warwick also benefits from several other NV experiments for quantum technology focused on nanoscale and bulk magnetometry both at room temperature and in helium cryostats.

The project is mainly experimental with a theoretical component (full training provided), and includes collaboration with academic and industrial partners. The start date for the project will be 1st October 2019. You should have obtained, or be about to obtain a First or Upper Second Class UK Honours degree in Physics, Engineering or a related subject. Applicants with equivalent qualifications gained outside the UK will also be considered.

The successful applicant will join a team of over 10 academics and 20 PhD students in the departments of Physics, Chemistry, Engineering and the Warwick Manufacturing Group all researching into different aspects of Diamond Science and Technology. Warwick has excellent facilities for characterisation and processing of diamond, as well as the fabrication of micro/nano diamond devices and an exceptionally strong record of successful collaboration with industry.

For further information please contact Gavin Morley (gavin.morley@warwick.ac.uk) or DST.Admin@warwick.ac.uk.